

Consumer Portal P6 Customer Needs Meter Device

1 Descriptions of Function

All prior work (intellectual property of the company or individual) or proprietary (non-publicly available) work should be so noted.

1.1 Function Name

Name of Function: Customer sign-up for Demand Reduction Program needing the installation of a new interval meter

1.2 Function ID

IECSA identification number of the function

C-2.2

1.3 Brief Description

Describe briefly the scope, objectives, and rationale of the Function

A customer wants to sign up for the Demand Reduction Program offered by the utility which would give the utility permission to cycle customer's air conditioning system during peak load periods in return for incentives. The utility representative signs up the customer, handles installation of needed devices along with a new interval meter for gathering Measurement and Verification data and implements the customer's participation in the program. The data collected by the interval meter is used in report to the PublicUtilityCommision as well as to provide Power Purchases department at the utility with a tool for economic dispatch, and to the Transmission and Distribution (Transmission Service Provider) department at the utility for load reduction dispatch by Transmission Service Provider circuit.

1.4 Narrative

A complete narrative of the Function from a Domain Expert's point of view, describing what occurs when, why, how, and under what conditions. This will be a separate document, but will act as the basis for identifying the Steps in Section 2.

A western utility has a residential customer base of 1 million meters. The meters are installed in single-family detached housing (SFD), single-family attached housing (SFA), apartment buildings and mobile homes. The utility has a high residential turnover rate as customers come to and leave the service area more frequently than typical utilities.

The utility has demand relief requirements and has multiple demand response programs in place. It additionally supports active residential conservation programs as well as residential alternate, renewable and distributed generation.

The results of all of these efforts are reported to the State PUC as part of their requirements to receive credit in rate base.

On Monday morning a residential customer of utility X calls Customer Service and requests a “sign up” in the utility’s air-conditioning demand response programs that they read about in the newspaper. The Customer Service (CSR) representative transfers the call along with the customer’s account information “utility program specialist” while the customer is still on the line. The program specialist (PS) opens up a computer file that delineates the features and requirements for participation in each of the utility’s AC demand reduction program (that includes a gateway product, a smart thermostat product, and a simple switching product, all with different incentives). The customer selects a specific program and the specialist asks pertinent questions about the customer’s participation to help reduce problems.

The specialist sees a “flag” that shows that the customer is in a new subdivision and that the utility needs additional Measurement & Verification (M & V) data in that area. The specialist selects a convenient date for installation of equipment, including a new interval meter, and to start the program at the specific residence. Once the program specifics and the customer specifics are entered into the Demand Response database, the installation company is notified of the specific program requested, the installation date, customer information and specific tracking number/ID. The information is automatically downloaded into a PDA designed to accommodate the data. The meter shop is also notified and prepares a meter installation at the same time as the curtailment equipment. The meter number and associated information is loaded into the PDA for processing along with the other data.

The installer places the appropriate equipment, in this case a DLC switch, on the customer’s AC unit, tests the system with a handheld unit, and places all information (including the meter ID) into the same PDA as used to download the original request. At the end of the day, the PDA is connected to the installer’s computer system and via a web-hosted database all information is uploaded to the utility. The utility software automatically notifies the DemandResponseProgramManager (DRPM), advises billing that the customer will receive a financial incentive, which is listed on their monthly bill during the appropriate summer months and subtracted from the “amount due” line. At the end of the summer program, the billing software automatically reverts to the normal invoice and removes incentives from the bill.

In addition to billing, the program initiation also triggers a summer-months energy consumption-tracking program. The software recalls specific customer usage data for the previous year for the months of June, July, August and September. The database also includes average daily and monthly ambient temperatures, which will be used with customer usage data to ascertain savings and relative demand reduction. The information is inserted into a database that is used by the DemandResponseProgramManager to assess relative load reduction as well as to determine if free-

ridership is an issue. In this case the meter data is also collected remotely by a contracted M & V firm via satellite. The data is logged in and specific software calculates actual demand reduction during the summer curtailment periods. The data is used to advise the PUC of program results as well as to provide Power Purchases department at the utility with a tool for economic dispatch, and to the Transmission and Distribution (Transmission Service Provider) department at the utility for load reduction dispatch by Transmission Service Provider circuit.

1.5 Actor (Stakeholder) Roles

Describe all the people (their job), systems, databases, organizations, and devices involved in or affected by the Function (e.g. operators, system administrators, technicians, end users, service personnel, executives, SCADA system, real-time database, RTO, RTU, IED, power system). Typically, these actors are logically grouped by organization or functional boundaries or just for collaboration purpose of this use case. We need to identify these groupings and their relevant roles and understand the constituency. The same actor could play different roles in different Functions, but only one role in one Function. If the same actor (e.g. the same person) does play multiple roles in one Function, list these different actor-roles as separate rows.

<i>Grouping (Community)</i>		<i>Group Description</i>
<i>Customer Site</i>		<i>Those entities that are located at customer’s premises</i>
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
Customer	Person	One requesting the sign up for the Demand Reduction Program.
CustomerCommunicationPortal	System	System handling communications function at customer’s premises
DLCSwitchController	Device	Device performing cycling of the air conditioning unit
Meter Device	Device	Device capturing energy usage data for use in Measurement & Verification purposes.
RemoteMeterDevice	System	System for transmitting interval meter data on demand to the utility [in this case, using a satellite communications link provided by a third party contracted by the

<i>Grouping (Community)'</i>		<i>Group Description</i>
<i>Customer Site</i>		<i>Those entities that are located at customer's premises</i>
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
		utility].

Replicate this table for each logic group.

<i>Grouping (Community)'</i>		<i>Group Description</i>
<i>Load Serving Entity Customer Service</i>		<i>Those entities that are charged with handling customer service functions for the power company</i>
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
Load Serving Entity	System	Power company communications system that handles customer call center services
CSR	Person	Customer Service Representative (CSR), Person who interfaces with the customer initially for the power company
Utility Program Specialist	Person	Person who handles load reduction-related services for the customer
CustomerInformationDatabase	System	System that contains information about customer accounts of the power company
DemandReductionProgramDatabase	System	System that contains information about all of the Demand Reduction Program [DemandReductionProgramDatabase] Database offered by the utility, participation requirements, equipment details and links to customer billing system

<i>Grouping (Community)</i>		<i>Group Description</i>
<i>Load Serving Entity Customer Service</i>		<i>Those entities that are charged with handling customer service functions for the power company</i>
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
		for passing incentive information
CustomerBillingSystem	System	System that handles generation of bills for the services provided to the customer
Customer ID Creation	Device	A common customer identification key that is used by service providers authorized by the customer to identify all of their service accounts
CustomerSiteInstallationDatabase	System	System that handles scheduling installation of equipment at customer premises [in this case, the DLC switch], specifying equipment to be installed, confirmation of completion of installation and links to the billing system using the common customer id
M & V Information Database	System	System that contains M & V information broken down by utility service area segments [such as residential subdivisions] that can be used by various utility departments, such as Power Purchase, Transmission Service Provider, etc

<i>Grouping (Community)</i>		<i>Group Description</i>
<i>Installer</i>		<i>Those entities that are associated with the installation function</i>
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
Installer	Person	Utility person assigned to handle the specified customer site installation task

<i>Grouping (Community)</i>		<i>Group Description</i>
<i>Installer</i>		<i>Those entities that are associated with the installation function</i>
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
DLCSwitchController	System	System handling cycling of air conditioning equipment at customer's premises [generally consists of a RF receiver and a switch component to turn the air conditioning compressor on/off].
Meter Device	Device	Device for capturing energy usage information along with time periods during the day when the energy was consumed.
MeterID Provider	Device	Unique identifier that can be used by the utility to track specific meter installed at customer site, in this case the new interval meter
RemoteMeter Device	System	System for transmitting interval meter data on demand to the utility [in this case, using a satellite communications link provided by a third party contracted by the utility].
InstallationSystem	System	System for managing the installation activities at the customer site – in this case consists of a PDA that contains the installation order information, a test unit to verify proper installation and software to record installation details.
Installer Computer	System	System for accessing utility's installation database, downloading specific order information to the InstallationSystem PDA, communications link to the utility's network to access order data and to upload confirmation data.
CustomerSiteInstallationDatabase	System	System that handles scheduling installation of equipment at customer premises [in this case, the DLC switch], specifying equipment to be installed, confirmation of completion of installation and links to the billing system using the common customer id

<i>Grouping (Community)</i>		<i>Group Description</i>
<i>Others</i>		<i>Those entities that are involved in this activity, but do not fit in any of the Groupings above</i>
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
Metering	Person	Department at the utility that manages meters and their installation at the customer site
Power Purchase	Person	Department at the utility company that handles procurement of power resources for the utility company.
Transmission Service Provider	Person	Department at the utility company that handles the Transmission and Distribution (T&D) functions for the utility company.
Satellite Communications Network	System	System responsible for remote meter reading and transmitting the data to the utility company.
PublicUtilityCommission	Person	State Public Utility Commission {PUC}: The entity that receives results of the utility's demand reduction program.
DemandResponseProgramManager	Person	Person managing the DemandReductionProgramDatabase at the utility
EnergyServiceProvider		
ServiceProvider		
AirConditioningEquipment		

1.6 Information exchanged

Describe any information exchanged in this template.

<i>Information Object Name</i>	<i>Information Object Description</i>
Customer Demand Reduction Program Signup Request	Information from the customer call for signing up to participate in the utility's Demand Reduction Program
Customer System Installation Order	Information on scheduling the installation at customer's site, equipment to be installed [interval meter, remote meter reading module and DLC], programming information on cycling regime, details to be passed on to the billing program on initiating incentive reward, intimation to DemandResponseProgramManager and triggers to start tracking energy usage for program performance verification, and interval data for utility's M & V functions
M & V Information Request	Information trigger generated by the utility's customer information database to initiate recording of interval energy usage data
M & V Information Delivery	Delivery of M & V information collected from customer's site to utility's Power Purchase and Transmission Service Provider departments and to the PublicUtilityCommision for program results verification

1.7 Activities/Services

Describe or list the activities and services involved in this Function (in the context of this Function). An activity or service can be provided by a computer system, a set of applications, or manual procedures. These activities/services should be described at an appropriate level, with the understanding that sub-activities and services should be described if they are important for operational issues, automation needs, and implementation reasons. Other sub-activities/services could be left for later analysis.

<i>Activity/Service Name</i>	<i>Activities/Services Provided</i>
Signup Customer to Requested Demand Reduction Program	Initiate actions to modify customer's account information to indicate details of participation in the Demand Reduction Program specified by the customer, generate trigger to installation scheduling program, and generate trigger to the Metering Department to install a new interval meter for M & V

<i>Activity/Service Name</i>	<i>Activities/Services Provided</i>
	functionality
Set Up Customer System Installation Order	Initiate actions to schedule installation at customer site, and transmit customer site information, equipment details and scheduling to the installer
System Installation	Perform installation of specified load control system at customer site, verify system performance, and upload installation confirmation back to utility; perform installation of interval meter with remote meter reading module, verify operation and notify utility of interval meter installation
Installation Follow-up	Initiate actions to update load reduction system to send out appropriate control signals to customer unit, update customer billing information with applicable incentives, alert the applicable DemandResponseProgramManager about installation, initiate energy usage tracking, initiate obtaining interval data and set up flags in the billing database to revert to regular billing at the end of incentive period
M & V Information Delivery	Initiate actions to transmit interval energy usage data to utility's Power Purchase and Transmission Service Provider departments, and transmit results of the DemandReductionProgramDatabase to the PublicUtilityCommision

1.8 Contracts/Regulations

Identify any overall (human-initiated) contracts, regulations, policies, financial considerations, engineering constraints, pollution constraints, and other environmental quality issues that affect the design and requirements of the Function.

<i>Contract/Regulation</i>	<i>Impact of Contract/Regulation on Function</i>
Demand Reduction Program Tariffs	Equipment installed at customer site, cycling regime implemented and incentive rewards applied to customer bill

<i>Policy</i>	<i>From Actor</i>	<i>May</i>	<i>Shall Not</i>	<i>Shall</i>	<i>Description (verb)</i>	<i>To Actor</i>
Cycle Energy to Equipment	EnergyServiceProvider	X			Cycle power to air conditioning unit on utility trigger	AirConditioningEquipment
Provide Load Control Equipment	ServiceProvider			X	Install specified equipment at customer site	Customer
Provide Incentive Rewards	EnergyServiceProvider			X	Provide incentive reward on customer energy bill	Customer
Modify Incentive Rewards	EnergyServiceProvider			X	Modify incentive reward on customer energy bill	Customer
Install Meter Device	EnergyServiceProvider			X	Install new interval meter at customer site with remote meter reading capability	EnergyServiceProvider

<i>Constraint</i>	<i>Type</i>	<i>Description</i>	<i>Applies to</i>
<i>Program Participation</i>	<i>Level of Participation</i>	<i>The level of Demand Reduction Program participation chosen by the customer</i>	<i>Power cycling regime implemented and amount of incentive reward provided</i>
<i>Reward Period</i>	<i>Inactive</i>	<i>Months of the year when the program is not active [i.e., non-summer months for this program]</i>	<i>No incentive reward provided</i>
<i>Energy Usage</i>	<i>Minimum Threshold</i>	<i>Tracked energy usage to meet or exceed program requirements to qualify to participate in the program and receive incentive reward on bill</i>	<i>Eligibility to continue participation in the program</i>

2 Step by Step Analysis of Function

Describe steps that implement the function. If there is more than one set of steps that are relevant, make a copy of the following section grouping (Preconditions and Assumptions, Steps normal sequence, and Steps alternate or exceptional sequence, Post conditions)

2.1 Steps to implement function

Name of this sequence.

2.1.1 Preconditions and Assumptions

Describe conditions that must exist prior to the initiation of the Function, such as prior state of the actors and activities

Identify any assumptions, such as what systems already exist, what contractual relations exist, and what configurations of systems are probably in place

Identify any initial states of information exchanged in the steps in the next section. For example, if a purchase order is exchanged in an activity, its precondition to the activity might be 'filled in but unapproved'.

<i>Actor/System/Information/Contract</i>	<i>Preconditions or Assumptions</i>
Customer ID Creation	Assumes that a common customer id is used by the customer service, Demand Reduction Program, installation and billing departments
Demand Reduction Program tariff	Assumes that a tariff exists with details of program requirements and incentive rewards that the customer can sign up
CustomerCommunicationPortal	Assumes that the CustomerCommunicationPortal is installed in the customer location that will permit usage monitoring at specific times to verify program effectiveness
Meter Device	Based on the availability of meter with remote meter reading module and satellite-based communications network

<i>Actor/System/Information/Contract</i>	<i>Preconditions or Assumptions</i>
MeterID Provider	Assumes that a unique meter id is assigned to customer's meter and is used for the interval energy usage information tracking

2.1.2 Steps – Normal Sequence

Describe the normal sequence of events, focusing on steps that identify new types of information or new information exchanges or new interface issues to address. Should the sequence require detailed steps that are also used by other functions, consider creating a new “sub” function, then referring to that “subroutine” in this function. Remember that the focus should be less on the algorithms of the applications and more on the interactions and information flows between “entities”, e.g. people, systems, applications, data bases, etc. There should be a direct link between the narrative and these steps.

The numbering of the sequence steps conveys the order and concurrency and iteration of the steps occur. Using a Dewey Decimal scheme, each level of nested procedure call is separated by a dot ‘.’. Within a level, the sequence number comprises an optional letter and an integer number. The letter specifies a concurrent sequence within the next higher level; all letter sequences are concurrent with other letter sequences. The number specifies the sequencing of messages in a given letter sequence. The absence of a letter is treated as a default ‘main sequence’ in parallel with the lettered sequences.

Sequence 1:

*1.1 - Do step 1
1.2A.1 - In parallel to activity 2 B do step 1
1.2A.2 - In parallel to activity 2 B do step 2
1.2B.1 - In parallel to activity 2 A do step 1
1.2B.2 - In parallel to activity 2 A do step 2
1.3 - Do step 3
1.3.1 - nested step 3.1
1.3.2 - nested step 3.2*

Sequence 2:

*2.1 - Do step 1
2.2 - Do step 2*

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
#	<i>Triggering event? Identify the name of the event.¹</i>	<i>What other actors are primarily responsible for the Process/Activity? Actors are defined in section 1.5.</i>	<i>Label that would appear in a process diagram. Use action verbs when naming activity.</i>	<i>Describe the actions that take place in active and present tense. The step should be a descriptive noun/verb phrase that portrays an outline summary of the step. "If ...Then...Else" scenarios can be captured as multiple Actions or as separate steps.</i>	<i>What other actors are primarily responsible for Producing the information? Actors are defined in section 1.5.</i>	<i>What other actors are primarily responsible for Receiving the information? Actors are defined in section 1.5. (Note – May leave blank if same as Primary Actor)</i>	<i>Name of the information object. Information objects are defined in section 1.6</i>	<i>Elaborate architectural issues using attached spreadsheet. Use this column to elaborate details that aren't captured in the spreadsheet.</i>	<i>Reference the applicable IECSA Environment containing this data exchange. Only one environment per step.</i>
1.1	Customer call to utility	Customer	Request program signup	Customer service representative identifies customer account	CustomerInformationDatabase	CSR	Customer account information	?	Customer / ESP
1.2		CSR	CSR determines nature of service request	CSR determines nature of service request [in this case, signup for DemandReductionProgramDatabase]	Customer	CSR	Program signup request		Customer / ESP
1.3		CSR	Transfers call to Program Specialist	Transfers call to utility's Program Specialist	CSR	Utility Program Specialist	Customer account information, Program signup request		Customer / ESP
2.1	Customer interest in signing up for DLRP	Utility Program Specialist	Determines specific DLRP	Utility Program Specialist determines which level of DLRP is appropriate for this customer	CustomerInformationDatabase, DemandReductionProgramDatabase	Customer	DLRP details		Customer / ESP

¹ Note – A triggering event is not necessary if the completion of the prior step – leads to the transition of the following step.

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
2.1.1		Utility Program Specialist	Signup customer to specific DLRP	Program Specialist signs up customer to the DLC switch program	CustomerInformationDatabase, DemandReductionProgram Database	Customer, CustomerBillingSystem	Specific program requirements and reward incentives		Customer / ESP
2.1.2		Utility Program Specialist	Schedules installation	Program Specialist schedules installation	CustomerInformationDatabase	CustomerSite InstallationDatabase, Installer	Installation details		Customer / ESP
2.2	Request to install equipment for customer by Utility Program Specialist	Installer	Equipment is installed	Specified equipment is installed and tested by installation service providers	Installer	CustomerSite InstallationDatabase, DemandReductionProgram Database Manager, CustomerBillingSystem	Installation confirmation		Customer / ESP
2.3	New customer installation	CustomerCommunication Portal	Monitor energy usage	CustomerCommunication Portal is alerted to monitor energy usage and ambient temperatures	CustomerCommunication Portal, CustomerInformationDatabase	DemandReductionProgram Database	Average and peak temperatures, customer's historical energy usage and current energy usage		Customer / ESP
2.4		CustomerBillingSystem	Billing system generates	Billing system generates summer billing with applicable reward	CustomerBillingSystem	Customer	Monthly billing with deductions for applicable		Customer / ESP

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
			billing	incentives			incentives		
3.1	Customer interest in signing up for DLRP	Utility Program Specialist	Flag Customer is in a new subdivision	Utility Program Specialist notices “flag” that the customer is in a new subdivision where the utility needs additional M & V data	CustomerInformationDatabase, M & V Information Database	Utility Program Specialist	Flag requesting additional M & V data in customer’s location		Customer / ESP
3.2		Utility Program Specialist	Initiates new interval meter installation request	Utility Program Specialist initiates new interval meter installation request	Utility Program Specialist, CustomerInformationDatabase	Utility Metering Department	Customer information and interval meter details		Customer / ESP
3.2.1	Initiates new interval meter installation request	Utility Metering Department	Metering delegates task to installation service provider (installer)	Metering delivers meter with its assigned meter id to the installation service provider	Utility Metering Department	CustomerSiteInstallationDatabase, Installer	New interval meter, its id details, RemoteMeterDevice and associated installation information		Customer / ESP
3.2.2	New meter installation request	Installer	Installs meter at customer site	Installation service provider uploads confirmation after the meter is installed in service at the customer site	Installer, Installer Computer	CustomerInformationDatabase, CustomerSiteInstallationDatabase, Utility Metering Department, Satellite	Notification of the active interval meter and its id details		Customer / ESP

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
						Communications Network			
3.3		Meter Device, RemoteMeter Device, Satellite Communications Network	Collect M & V data	Initiate collection of M & V data from customer site	Meter Device, RemoteMeter Device, Satellite Communications Network	CustomerInformationDatabase, DemandReductionProgram Database, DemandReductionProgram Database Manager, M & V Information Database, Power Purchase, Transmission Service Provider, PublicUtility Commision	Actual demand reduction during the summer curtailment periods		Customer / ESP

2.1.3 Steps – Alternative / Exception Sequences

Describe any alternative or exception sequences that may be required that deviate from the normal course of activities. Note instructions are found in previous table.

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments

2.1.4 Post-conditions and Significant Results

Describe conditions that must exist at the conclusion of the Function. Identify significant items similar to that in the preconditions section.

Describe any significant results from the Function

<i>Actor/Activity</i>	<i>Post-conditions Description and Results</i>
Consumer	Program cycling rate on air conditioning equipment and corresponding reward incentives on monthly bills; interval meter installed on site
DLC switch system	Implement program cycling instructions at customer site
CustomerInformationDatabase	Updated with requested program participation level information
Billing system database	Updated with applicable reward incentive information
DLRP database	Updated with assigned program participation level
DemandReductionProgramDatabase Manager	Updated with program participation level
M & V information database	Updated with actual energy usage information at customer site
Power Purchase	Tool to plan economic power dispatch

<i>Actor/Activity</i>	<i>Post-conditions Description and Results</i>
Transmission Service Provider	Tool for load reduction dispatch by Transmission Service Provider circuit
PublicUtilityCommision	Verification information of DLRP performance results

2.2 Architectural Issues in Interactions

Elaborate on all architectural issues in each of the steps outlined in each of the sequences above. Reference the Step by number..

2.3 Diagram

For clarification, draw (by hand, by Power Point, by UML diagram) the interactions, identifying the Steps where possible.

3 Auxiliary Issues

3.1 References and contacts

Documents and individuals or organizations used as background to the function described; other functions referenced by this function, or acting as “sub” functions; or other documentation that clarifies the requirements or activities described. All prior work (intellectual property of the company or individual) or proprietary (non-publicly available) work must be so noted.

ID	Title or contact	Reference or contact information
[1]	P. S. Vishwanath	Paragon Consulting Services, 301-323-4088
[2]	Joe Kelly	Paragon Consulting Services, 503-978-8289

3.2 Action Item List

As the function is developed, identify issues that still need clarification, resolution, or other notice taken of them. This can act as an Action Item list.

ID	Description	Status
[1]		
[2]		

3.3 Revision History

For reference and tracking purposes, indicate who worked on describing this function, and what aspect they undertook.

No	Date	Author	Description
0.1	December 15, 2003	P S V	

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